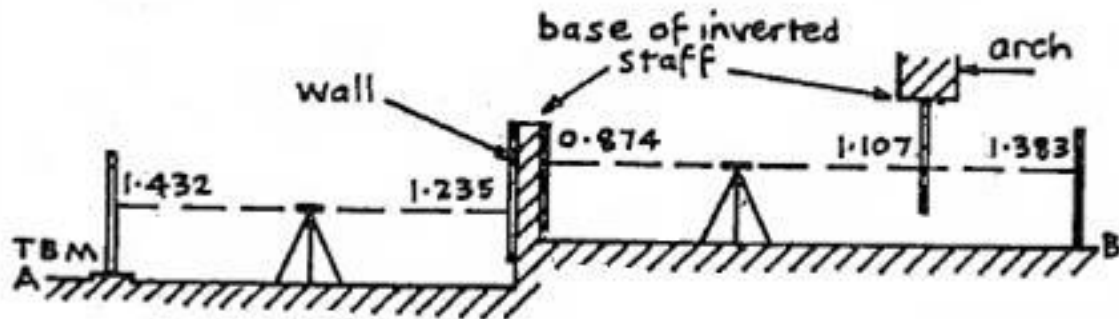


Key Solution H.w 1

Problem 1:

Calculate the R.L of wall, arch and point B in the shown figure. The elevation of TBM is 100.00 m?

Also show the arithmetic check



Station	B.S	I.S	F.S	H.I	R.L	Remarks
A	1.432			101.432	100.000	TBM
wall	-0.874		-1.235	101.793	102.667	
Arch		-1.107			102.900	
B			1.383		101.410	

$$\sum B.S = 1.432 + -0.874 = 0.558,$$

$$\sum F.S = -1.235 + 1.383 = 0.148,$$

$$\sum B.S - \sum F.S = 0.558 - 0.148 = 0.41$$

$$\text{The last R.L} - \text{the First R.L} = 101.410 - 100.000 = 0.41 \text{ (the same as } \sum B.S - \sum F.S)$$

Problem 2:

The following staff readings were observed successively with a level, the instrument is moved after the third, sixth and eighth readings. 2.228, 1.606, 0.988, 2.090, 2.864, 1.262, 0.602, 1.982, 1.044, 2.684 m enter the reading in record book and calculate R.L. if the first reading was taken at a B.M of 432.383m (use first the rise and fall method then the Height of instrument method)

Station	B.S	I.S	F.S	H.I	R.L	REMARKS
1	2.228			434.612	432.384	B.M.
2		1.606			433.006	
3	2.090		0.988	435.714	433.624	3 RD C.P.
4		2.864			432.850	
5	0.602		1.262	435.054	434.452	6 TH C.P
6	1.044		1.982	434.116	433.072	8 TH C.P
7			2.684		431.432	

$$\text{CHECK } \sum \text{B.S} - \sum \text{F.S} = 5.964 - 6.916 = -0.952 = \text{LAST R.L} - \text{FIRST R.L} = 431.432 - 432.384 = -0.952$$

Station	B.S	I.S	F.S	Rise	Fall	R.L	REMARKS
1	2.228					432.384 M	B.M.
2		1.606		0.622		433.006	
3	2.090		0.988	0.618		433.624	3 RD C.P.
4		2.864			0.774	432.850	
5	0.602		1.262	1.602		434.452	6 TH C.P
6	1.044		1.982		1.38	433.072	8 TH C.P
7			2.684		1.64	431.432	

$$\text{CHECK } \sum \text{B.S} - \sum \text{F.S} = 5.964 - 6.916 = -0.952 = \text{LAST R.L} - \text{FIRST R.L} = 431.432 - 432.384 = -0.952$$

$$\sum \text{RISE} - \sum \text{FALL} = 2.842 - 3.794 = -0.952$$

Problem 3:

Complete the following table with the appropriate values and perform the arithmetic check.

Station	B. S	I.S	F. S	H. I	R. L
BM	2.150			524.765	522.615
1		0.520			524.245
2		0.860			523.905
3		1.900			522.865
4	0.950		3.500	522.215	521.265
5		1.880			520.335
6		0.760			521.455
7	1.500		0.850	522.865	521.365
8		1.880			520.985
9			2.500		520.365

$$\sum B.S = 2.150 + 0.950 + 1.500 = 4.600,$$

$$\sum F.S = 3.500 + 0.850 + 2.500 = 6.850,$$

$$\sum B.S - \sum F.S = 4.600 - 6.850 = -2.25$$

$$\text{The last R.L} - \text{the First R.L} = 520.365 - 522.615 = -2.250 \text{ (the same as } \sum B.S - \sum F.S)$$